

WHAT IS CLAIMED IS:

1. A shaft coupling device which couples a first shaft and a second shaft together, comprising:

5 a grip unit to be attached to the first shaft and including a grip portion configured to grip the second shaft, the grip portion having an end with notches of a length being parallel with an axial direction of the first shaft and; and

a grip force acting unit to be attached to the second shaft and configured to cause a grip force for gripping the second shaft to act on  
10 the grip portion by moving the grip portion in a radial direction of the second shaft.

2. The shaft coupling device according to claim 1, wherein the grip unit is detachably attached to the first shaft.

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3. The shaft coupling device according to claim 1, wherein the grip portion and the first shaft are one piece.

4. The shaft coupling device according to claim 1, wherein end  
20 portions of the first shaft and the second shaft, the end portions being coupled to each other are respectively inserted into a shaft center holding portion configured to hold the first shaft and the second shaft coaxially to each other, and the shaft center holding portion is  
positioned at a distance away from a tip of the end of the grip portion,  
25 the distance being greater than the length of the notches.

5. The shaft coupling device according to claim 4, wherein the shaft center holding portion is a portion of the grip unit:
6. The shaft coupling device according to claim 1, wherein the grip force acting unit causes the grip force to act on the grip portion by abutting on the grip portion to move the grip portion in the radial direction when the grip force acting unit is moved toward the grip unit.
7. The shaft coupling device according to claim 6, wherein the grip force acting unit and the grip unit include screw portions, and the grip force acting unit moves toward the grip unit when the screw portions are screwed onto each other.
8. The shaft coupling device according to claim 6, wherein a contacting portion of the grip unit at which the grip unit contacts the grip force acting unit is tapered, and the grip force acting unit abuts on the contacting portion to move the grip portion in the radial direction when the grip force acting unit is moved toward the grip unit.
9. The shaft coupling device according to claim 1, wherein the grip force acting unit is a clamp member configured to fasten the grip portion from around an outer periphery of the grip portion.
10. A shaft coupling device that couples a first shaft and a second shaft, comprising:

a grip unit including a parallel surface parallel with a central axis of the first shaft and configured to grip the second shaft by abutting the parallel surface on the second shaft; and

a grip force acting unit configured to cause a grip force for  
5 gripping the second shaft to act on the parallel surface,

wherein the grip force acting unit moves along an outer peripheral surface of the grip unit in parallel with a central axis of the second shaft to change a pressure acting on the grip unit, and

the parallel surface of the grip unit is caused to abut on an outer  
10 peripheral surface of the second shaft by the pressure to grip the second shaft.

11. The shaft coupling device according to claim 10, wherein one of the first shaft and the second shaft is a rotating member supporting  
15 shaft configured to support a rotating member and another one of the first shaft and the second shaft is an output shaft of a motor configured to rotate the rotating member supporting shaft.

12. The shaft coupling device according to claim 11, wherein the  
20 grip force acting unit rotates around and moves in parallel with the central axis of the output shaft as the grip force acting unit is screwed onto the grip unit.

13. The shaft coupling device according to claim 12, wherein the  
25 grip force acting unit is rotated in the same direction as a forward

rotating direction of the output shaft when the grip force acting unit is screwed onto the grip unit, such that the pressure acting on the grip unit is increased.

- 5    14.    The shaft coupling device according to claim 12, wherein  
the output shaft includes a projecting portion on an outer  
periphery of the output shaft, and  
the grip force acting unit includes a groove portion configured to  
fit with the projecting portion.

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15.    An image formation apparatus comprising:  
a rotating member supporting shaft configured to support a  
rotating member;

an output shaft of a motor configured to rotate the rotating  
15 member supporting shaft; and

- a shaft coupling device  
configured to couple the rotating member supporting  
shaft and the output shaft, and

includes

20 a grip unit having a grip portion to be attached to  
one of the rotating member supporting shaft and the output shaft to grip  
another one of the rotating member supporting shaft and the output  
shaft, and

a grip force acting unit to be attached to the  
25 another one to cause a grip force for gripping the another one to act on

the grip portion by moving the grip portion in a radial direction of the another one.

16. The image formation apparatus according to claim 15, wherein  
5 the rotating member supporting shaft includes

a rotating engagement member integrated with the rotating member supporting shaft and engaged with the rotating member to rotate integrally with the rotating member , and

a bearing that rotatably supports the rotating member  
10 supporting shaft, and

the rotating member is attachable to and detachable from the rotating member supporting shaft.

17. The image formation apparatus according to claim 15, wherein  
15 the rotating member is a drum-shaped photosensitive member.

18. The image formation apparatus according to claim 17,  
comprising a plurality of the photosensitive member .

20 19. The image formation apparatus according to claim 15, wherein the rotating member is a belt supporting member that supports a belt so as to allow conveyance of the belt.

20. The image formation apparatus according to claim 15, wherein  
25 the motor is of a direct driving type not having a reduction mechanism.

21. The image formation apparatus according to claim 15, wherein the motor includes a planetary roller reduction mechanism.

22. The image formation apparatus according to claim 17, further  
5 comprising a structural unit  
including the photosensitive member integrally assembled with at least one of a charging device, a developing device, and a cleaning device for cleaning a surface of the photosensitive member, and  
being attachable to and detachable from the rotating member  
10 supporting shaft.

23. A process cartridge to be mounted in an image formation apparatus comprising a rotating member supporting shaft configured to support a rotating member; an output shaft of a motor configured to  
15 rotate the rotating member supporting shaft; and a shaft coupling device configured to couple the rotating member supporting shaft and the output shaft and includes a grip unit having a grip portion to be attached to one of the rotating member supporting shaft and the output shaft to grip another one of the rotating member supporting shaft and  
20 the output shaft, and a grip force acting unit to be attached to the another one to cause a grip force for gripping the another one to act on the grip portion by moving the grip portion in a radial direction of the another one, wherein the rotating member is a drum-shaped photosensitive member, the process cartridge  
25 comprises the photosensitive member integrally assembled with

at least one of a charging device, a developing device, and a cleaning device for cleaning a surface of the photosensitive member, and

is attachable to and detachable from the image formation apparatus when the rotating member supporting shaft is still being  
5 attached to the image formation apparatus.

24. A belt unit to be mounted in an image formation apparatus comprising a rotating member supporting shaft configured to a rotating member; an output shaft of a motor configured to rotate the rotating  
10 member supporting shaft; and a shaft coupling device configured to couple the rotating member supporting shaft and the output shaft and includes a grip unit having a grip portion to be attached to one of the rotating member supporting shaft and the output shaft to grip another one of the rotating member supporting shaft and the output shaft, and a  
15 grip force acting unit to be attached to the another one to cause a grip force for gripping the another one to act on the grip portion by moving the grip portion in a radial direction of the another one, wherein the rotating member supporting shaft includes a rotating engagement member integral with the rotating member supporting shaft and  
20 engaged with the rotating member to rotate integrally with the rotating member, and a bearing configured to rotatably support the rotating member supporting shaft, and the rotating member is attachable to and detachable from the rotating member supporting shaft,

the rotating member is a belt supporting member configured to  
25 support a belt so as to allow conveyance of the belt,

the rotating member supporting shaft is fixed to the image formation apparatus, and

the belt supporting member is attachable to and detachable from the rotating member supporting shaft.

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25. An image formation apparatus comprising:

a rotating member supporting shaft configured to support a rotating member;

an output shaft of a motor configured to rotate the rotating member supporting shaft; and

10 a shaft coupling device

configured to couple the rotating member supporting shaft and the output shaft, and

includes

15 a grip unit including a parallel surface parallel with a central axis of the output shaft and configured to grip the rotating member supporting shaft by abutting the parallel surface on the rotating member supporting shaft, and

a grip force acting unit configured to cause a grip force gripping the rotating member supporting shaft to act on the parallel surface,

wherein the grip force acting unit moves along an outer peripheral surface of the grip unit in parallel with a central axis of the output shaft to change a pressure acting on the grip unit, and

25 the parallel surface of the grip unit is caused to abut on an outer



peripheral surface of the rotating member supporting shaft by the pressure to grip the rotating member supporting shaft.

26. The shaft coupling device according to claim 25, wherein the  
5 grip force acting unit rotates around and moves in parallel with the central axis of the output shaft as the grip force acting unit is screwed onto the grip unit.

27. The shaft coupling device according to claim 26, wherein the  
10 grip force acting unit is rotated in the same direction as a forward rotating direction of the output shaft when the grip force acting unit is screwed onto the grip unit, such that the pressure acting on the grip unit is increased.

15 28. The shaft coupling device according to claim 25, wherein the output shaft includes a projecting portion on an outer periphery of the output shaft, and the grip force acting unit includes a groove portion configured to fit with the projecting portion.

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29. A shaft coupling method of coupling a first shaft and a second shaft, comprising the steps of:

screwing for a first distance a first screw portion of a grip unit having a grip portion and provided at an end of the first shaft to grip the  
25 second shaft onto a second screw portion of a grip force acting unit

configured to cause a grip force for gripping the second shaft to act on a grip portion by moving the grip portion in a radial direction of the first shaft;

engaging the second shaft with the grip force acting unit such  
5 that the second shaft is not rotatable relatively to the grip force acting unit when the first and second screw portions have been screwed onto each other for the first distance;

screwing the first and second screw portions onto each other further for a second distance from the first distance by rotating the  
10 second shaft and restricting rotation of the first shaft to cause the grip force acting unit to move the grip portion in the radial direction such that the grip portion grips the second shaft.

30. The shaft coupling method according to claim 29, wherein  
15 the engaging includes inserting a central axis penetrating the second shaft in the radial direction and protruding from a surface of the second shaft into a notched groove of the grip force acting unit, and a rotating force is transmitted from the second shaft to the first shaft,

20 first through the pin and then through the notched groove, and

finally through the grip portion that grips the second shaft after the screw portions have been screwed further for the second distance.

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31. A shaft coupling method of coupling a first shaft and a second shaft, comprising:

abutting a parallel surface of a grip unit on an outer peripheral surface of the second shaft, the parallel surface being parallel with a central axis of the first shaft and configured to grip the second shaft;  
5 and

moving a grip force acting unit configured to cause a grip force for gripping the second shaft to act on the parallel surface, along an outer peripheral surface of the grip unit in parallel with a central axis of  
10 the second shaft to change a pressure acting on the grip unit.